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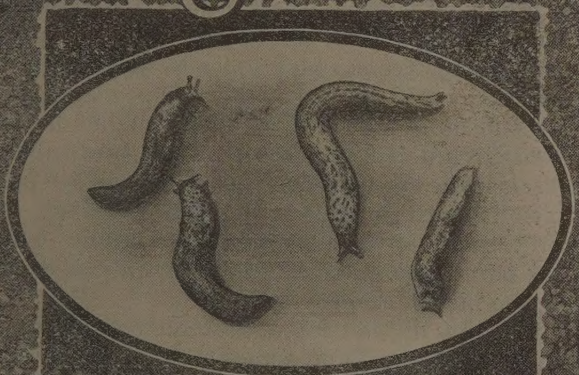
The Spotted Garden Slug



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UNITED STATES DEPARTMENT OF AGRICULTURE

Contribution from the Bureau of Entomology
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GARDENERS, MUSHROOM GROWERS, AND TRUCKERS frequently observe irregular holes in the foliage of such crops as lettuce, tomato, peas, and beans, either grown under glass or in the open, and mushrooms from which holes have been cut as by a mouse or rat. By close observation a glistening whitish substance will be seen on the plants or near by, and search under stones, old boards, and rubbish will disclose the cause of the injury—the garden slug.

Attack is most severe on delicate seedlings, but various tubers and roots are subject to injury. Potatoes are bored into and celery is frequently damaged during the bleaching process.

Garden slugs are not insects, although their injury is similar and they are sometimes called insects. They are mollusks and therefore related to the snails, although they have no external shell.

This bulletin describes the habits and development of the spotted garden slug and explains how to rid the premises or grounds of this destructive and otherwise undesirable tenant. The standard remedies for this and the other injurious garden slugs are lime, finely powdered salt, road dust, or other powders. Poisoned baits consisting of boiled potatoes or sweet potatoes sprinkled with arsenic are useful. The garden and greenhouse should be kept clean and free from rubbish and the slugs should be collected at night when they emerge from their hiding places.

THE SPOTTED GARDEN SLUG.[1]

CONTENTS.

	Page.		Page.
Plants and plant parts injured	3	Description	6
What the slug looks like	3	Development	7
History and distribution	4	Hibernation	7
Food and haunts	4	Natural enemies	7
Nature and extent of injury	5	How to abate the slug nuisance	7
Habits	5		

PLANTS AND PLANT PARTS INJURED.

THE SPOTTED GARDEN SLUG (fig. 1) in recent years has attracted considerable attention by its depredations in gardens, greenhouses, and mushroom beds. Its fondness for fungi makes it a serious pest when once it has gained access to a mushroom house. In a greenhouse its attack usually is confined to young, tender seedlings, but ornamentals are rendered unsightly and unsalable by the trail of mucus which exudes from the animal's body, as it crawls from place to place. It frequently is abundant in gardens, especially in cool, damp seasons; often causing serious loss to growers of such plants as celery, lettuce, peas, and beans.

WHAT THE SLUG LOOKS LIKE.

The spotted garden slug is one of the largest land mollusks of its kind and often attains a length of 7 inches when fully extended.

[1] Thirty-two species of garden slugs have been reported for the United States. Of these, four are introduced forms. Most of the native species are comparatively harmless so far as their ravages on crops and gardens are concerned. The conditions produced by the opening of the land for agricultural pursuits have effected decided hardships and forced them into the background. The larger west American slugs, however, some of which attain almost a foot in length, are occasionally an exception to this rule.

The real pests of our gardens, cellars, and wells are three introduced species, the spotted garden slug, *Limax maximus* L., ably discussed in this bulletin; the tawny garden slug, *Limax flavus* L., which is a smaller species rarely attaining a length of over 4 inches, and readily distinguished from the larger spotted garden slug by having the body of a more or less uniform dusky yellow shade with obsolete lighter yellowish spots and a tawny yellow shield and bluish tentacles, and the true garden slug, *Agriolimax agrestis* L. The last is probably the greatest pest of all the slugs in our country at present. It is a much smaller species, scarcely exceeding an inch and a half in length and much more often scarcely attaining an inch. It varies from uniform whitish through pale ochraceous, sometimes to lavender, purplish, or even almost black, with mottlings and specklings of various shades of brown. This little form, on account of its small size, can hide away in crevices to a much greater extent than the larger species, and therefore it is exceedingly abundant in city gardens, where it outnumbers the larger forms probably by 20 to 1. This may be considered the most important of the destructive slugs in our country at the present time. On account of its smaller size it has been transported more frequently to the interior than the other two species, which at the present are still largely distributed coastwise.

The remedies suggested for the destruction of the spotted garden slug will apply to any of the American species as well as to the other introduced forms. It may be well to add that, in the case of cisterns, wells, and cellars, sulphur fumigation has proved effective.—PAUL BARTSCH.

The individuals more generally found range in length from 1½ to 4 inches. The slug varies in color from a more or less yellowish gray or brown, mottled with black, to uniform dark gray and black. Usually three uninterrupted rows of black spots extend from the mantle, or shield-like covering on the fore part of the back and sides, to the hind end of the body (fig. 1). The younger forms usually are uniform in color. The mantle is yellowish, marked with black spots. The large breathing opening is situated on the right side near the base of the mantle. The long, stout "horns," or peduncles, which are thrust forward when the slug is in motion, bear the black eyes at the tip. A sticky mucous secretion exudes from the body of the creature.

FIG. 1. — The spotted garden slug, full grown. About natural size.

HISTORY AND DISTRIBUTION.

The spotted garden slug was first described in 1758 by Linnaeus, who found it in shaded places and woods. Its first appearance in the United States does not seem to be definitely recorded, but its occurrence in New England extends over a period of upwards of 50 years. The species is widely distributed, being known all over Europe, in Asia Minor, Corsica, Sicily, Sardinia, the Azores, Madeira, New Zealand, and the United States. It is more abundant along the Atlantic and Pacific coasts than in the interior of the United States.

FOOD AND HAUNTS.

This slug attacks plants of many kinds. Its favorite foods are fungi and stored tubers, but it is also fond of raw beef and sour milk. It has been recorded as feeding on lettuce (fig. 2), celery, tomato, parsnip, carrot, strawberry, beet, turnip, cabbage, onion, leeks, melons, beans, peas, white potato, sweet potato, and common grasses. It displays considerable fondness for the foliage of violets

The spotted garden slug thrives in dark and damp locations, such as those under old decaying boards and logs, under board walks, in cellars and creameries, along hedgerows, and beneath damp refuse.

NATURE AND EXTENT OF INJURY.

The slug injures the plant by gnawing large irregular holes in the leaves or by cutting off the stems, and by leaving after it a trail of sticky mucus on the plants and along the ground. Injury to mushrooms (fig. 3) is especially severe, the large holes cut by the slug ruining them for the market. Potatoes, both Irish and sweet, when

FIG. 2.—Work of the spotted garden slug on lettuce.

stored in damp, cool cellars, are also subject to attack. The slug is not content to feed on one tuber until that is entirely destroyed, but will pass from one to another, nibbling small holes in the potatoes near the edge of the pile or container. Celery in the beds during the bleaching process often harbors large numbers, which seriously damage the stems.

HABITS.

Soon after emerging from the eggs the young slugs move about in search of food. This consists of such material as is near at hand, since the young do not wander far. They remain four or five weeks

in a colony in the location where the eggs were deposited. The slugs remain under cover until nightfall and then come out to feed. The "homing" instinct is well developed in this species, and these slugs will return to the same place night after night unless disturbed, or unless the place becomes too dry for habitation. During their nocturnal excursions they shun all dry, dusty, or sharp surfaces. The route of the slugs back to their daily abode usually is the same as that taken when going forth. When full grown the slugs will travel long distances and overcome many obstacles in search of their favorite food. In confinement these creatures will attack one another, and when the weaker succumbs its body is devoured.

FIG. 3.—Work of the spotted garden slug on mushroom.

DESCRIPTION.

THE EGG.

The eggs are deposited in masses, held together by a light-colored substance, in moist places, such as under decaying boards, flowerpots, and refuse. Sometimes they are placed beneath the surface of the ground under clods of earth.

The translucent, light yellow eggs, with tough and elastic outer membrane, usually will be found in masses of from 50 to 70, though the writer has found 106 in one mass, and one female has been known to deposit 112 eggs in two days.

THE SLUG.

The newly hatched slug when extended is a little less than half an inch long and about one-seventh as wide as long. It is dull white, showing no coloration except where the dark eyestalks can be seen through the transparent mantle. In a few hours after hatching the mantle begins to darken, and in about two days the whole body of the animal has turned still darker, three broken longitudinal lines appearing, which run from the base of the mantle to the hind end of the body. The mantle then changes to a mottled gray. As the animal feeds it becomes of a darker and darker hue until in about a month it is dark brown and the black spots begin to appear. In some cases these spots, which are arranged in a line, disappear and the body is of a solid color. These black spots may or may not reappear. When full grown the slug is nearly 7 inches in length.

DEVELOPMENT.

The writer has found freshly deposited egg masses at all times from spring until fall. In a greenhouse or other structure which is heated during the cold months the females deposit their eggs the year round.

The incubation period varies with the temperature and moisture. In an atmosphere of from 60° to 70° F. the eggs hatch in about 28 days, but if the temperature is higher the young will appear in a shorter time.

The young slugs develop slowly, feeding very little in the younger stages. In 30 days they attain a length of about an inch. This growth, however, depends upon the abundance of food and upon the weather conditions. The slug is capable of living on very little food, but during such times growth is slow.

The exact time required by the animal to attain full growth is not known, but slugs held in captivity and reared from eggs made a growth of 2 inches in six months. These slugs were reared in a greenhouse and were supplied with an abundance of food.

HIBERNATION.

The spotted garden slug undoubtedly spends the winter below the frost line in the ground, in drain pipes, cellars, greenhouses, and pits, on well walls, and along foundations. The writer has never found any during the colder winter months in exposed places, such as under boards, or in any of the old haunts of summer. Slugs which were exposed to a temperature below freezing soon succumbed.

NATURAL ENEMIES.

Among the slug's few natural enemies is the common toad.

HOW TO ABATE THE SLUG NUISANCE.

ARSENICALS PARTIALLY EFFECTIVE.

Owing to its habit of feeding by night and concealing itself during the day, the spotted garden slug is very difficult to control. It will avoid food of a coarse nature.

The application of arsenicals to the plant is impractical, chiefly because attack is local and the creatures avoid most poisoned substances. The use of poisoned baits is not entirely satisfactory because of the slowness of the slug to change its diet unless this becomes necessary to prevent starvation. The methods of control to be used vary according to the location in which the slugs feed and the nature of the food plant. In mushroom beds it is not practical to employ a poisoned bait because the slug prefers fungi to all other foods.

Where large plants are being injured poisoned baits may be employed with fair results. For this purpose baked or boiled white potatoes sprinkled with white arsenic have been found effective. This bait should be placed so that one potato will be in about 2 square feet of the affected area. Inferior potatoes are quite as useful as sound ones, and large tubers or roots should be sliced.

CONTROL BY CLEAN METHODS.

Wherever this pest occurs cleanliness will accomplish much toward its riddance.

Slugs may be kept under control in the mushroom house, first, by a thorough cleaning and then by a careful examination of all the material taken into the house to make certain that no slugs or eggs are attached to it. Old boards and the edges of the compost pile may harbor eggs or young, and these should be examined carefully before they are carried into the house.

COLLECTING SLUGS AT NIGHT.

After slugs have become established in a greenhouse they should be sought out at night with a lantern or pocket flashlight. The slugs at this time may be found feeding or crawling about in search of food. At such times they can be easily collected and destroyed. In the daytime they may be traced to their retreats by the trail of slime which they leave behind. Loose boards and débris lying about should be turned over and examined for eggs and young slugs.

THE USE OF LIME AND SALT.

Lime is the standard remedy for slugs, and salt and soot are efficient.

In a mushroom house the slugs can be prevented from gaining access to mushrooms by a border about 2 inches wide of lime, salt, road dust, soot, or any cheap powder, placed around the edges of the beds. When the slug touches this substance it will wriggle into the material. This causes it to secrete slime copiously and soon it exhausts itself and dies.

In the greenhouse slugs are more difficult to control, because there is a wider range for their activities and their hiding places are more numerous and not readily located. Young seedling beds should be protected by a border of such substances as are recommended in the case of mushrooms. In the case of potted plants each pot should be taken out and examined before the border of repellent is placed around it, as such pots are among the favorite haunts of the young slugs.

TREATMENT IN THE FIELD.

When abundant in the field or garden the slug is even more difficult to control than in the mushroom house or greenhouse, and the only solution of the problem consists in thoroughly cleaning up the hiding places of the pest, around the edges of the garden, under old boards and stones, and in any place that is cool and moist. These places should then be sprinkled with lime, and where practicable lime should be applied directly to the area and plants on which the slugs are feeding. In time this will drive them away.

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